DENSO

RT1 AIR CONDITIONING UNIT

OWNERS MANUAL

Published: October 2012
REV #1: May 2013

DENSO AUTOMOTIVE SYSTEMS AUSTRALIA PTY LTD

AL00Z00004E

DENSO AUTOMOTIVE SYSTEMS AUSTRALIA PTY. LTD.
2-46 Merrindale Drive
Croydon Victoria 3136
tel: 03 8761 1449
email: service.department@denso.com.au

No stamp required
if posted in Australia

DENSO

Delivery Address:
2-46 Merrindale Dr
CROYDON SOUTH VIC 3136

Denso
Reply Paid 88460
CROYDON SOUTH VIC 3136

TABLE OF CONTENTS

1.	Foreword	2
2.	Inventory	2
3.	General Information	3
4.	Controls	5
5.	Operation	8
6.	Maintenance	10
7.	Technical Data	11
8.	Trouble Shooting	13

© **DENSO AUTOMOTIVE SYSTEMS AUSTRALIA PTY. LTD.**
May 2013
All rights reserved.
This book may not be reproduced or copied, in whole or in part, without the written permission of the publisher.
DENSO reserves the rights to make changes without prior notice.

1. **FOREWORD**

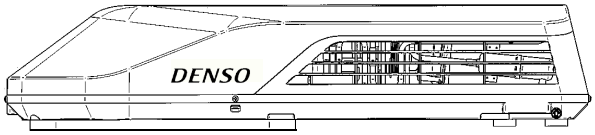
DENSO's RT1 air-conditioning unit is designed for installation on the roof top of fixed roof caravans and motor homes. Before using the unit, please take time to read this manual in detail, and follow the instructions on how to operate this product. Keep this manual in your caravan, and should you ever decide to sell your caravan, please make sure to pass this manual on to the next owner.

1.1 DEFINITION OF TERMS

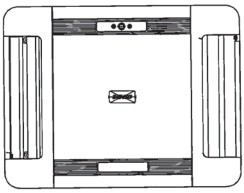
SYMBOLS	MEANINGS
⚠ **WARNING**	Indicates a possibility that "improper handling by the user may result in death or serious injury".
⚠ **CAUTION**	Indicates a possibility that "improper handling by the user, may result in injury and/or material loss".

2. **INVENTORY**

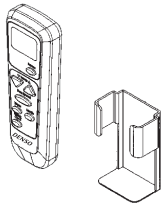
Your air-conditioner unit comprises the following items.



1. External Roof Top unit



2. Air Distribution Unit



3. Remote Control Unit including a wall bracket and batteries

NOTE: Images not to scale

3. GENERAL INFORMATION

3.1 The ability of the air-conditioner to maintain a desired temperature depends upon the heat entering or leaving your vehicle. The following simple guidelines should be followed to achieve the best comfort, lowest energy use and quietest operating noise.

a. Park your vehicle in a shaded area.

b. Keep all windows, doors, curtain and blinds closed while operating.

c. Select higher fan speeds for higher cooling performance.

d. Switch your air-conditioner to cooling early in the day, before the interior of the vehicle has become too hot.

e. If the interior of the vehicle is already hotter than the outside air, briefly open doors and windows to exhaust the hot air before starting the air-conditioner cooling.

f. Avoid using stoves and ovens that add heat to the vehicle's interior while the air-conditioner is cooling.

3.2 In humid conditions, the operation of an air-conditioner can cause the formation of condensate on cold surfaces inside your vehicle. Care must be taken to prevent this condensate from damaging personal items, or causing a build up of mould. Items that may be damaged by the condensate must be kept clear of the air distribution unit. In rare circumstances, condensate can form on this unit during use. Should there be formation of condensate, allow it to dry thoroughly after use.

NOTE: *Condensation can be reduced by keeping all doors and windows closed during air-conditioner operation, preventing humid air from entering the vehicle. The likelihood of condensation on the air distribution unit can be reduced by ensuring that the caravan is properly sealed, preventing entry of moisture laden air.*

⚠ WARNING

All electrical work and permanent wiring must be carried out by an appropriately qualified person in accordance with national wiring regulations and all other applicable local codes and regulatory authority requirements.

Repair to electrical components by non-certified technicians may result in death, personal injury and/or damage to the unit. All electrical components replaced must be genuine replacement parts, purchased from an authorised reseller.

⚠ WARNING

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience or knowledge, unless they are supervised and given instructions concerning the use of the appliance by a person responsible for their safety.

Children must be supervised at all times to ensure that they do not play with this appliance.

Prior to operation, familiarise yourself with the location of the safety circuit breaker and isolation switch for the air-conditioner on your caravan. In the event of a fault or damage, switch off the power supply, and contact an approved service agent for assistance.

a. Only a licenced electrician may replace the unit fuse. The fuse is located in the electrical control housing inside the roof top unit. Fuse rating is 250V/500VAC, 10A, T-Delay, 5x20mm supplied by DENSO.

b. The safety circuit breaker must be switched to 'off' position to disconnect it from the power supply before any disassembly or repairs.

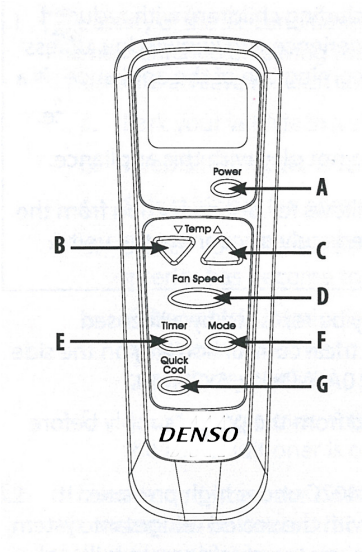
c. The air-conditioner uses the refrigerant R410a under high pressure. It is both dangerous and illegal to tamper with the sealed refrigerant system without appropriate licensing. Intentional release of refrigerant is illegal in Australia and New Zealand.

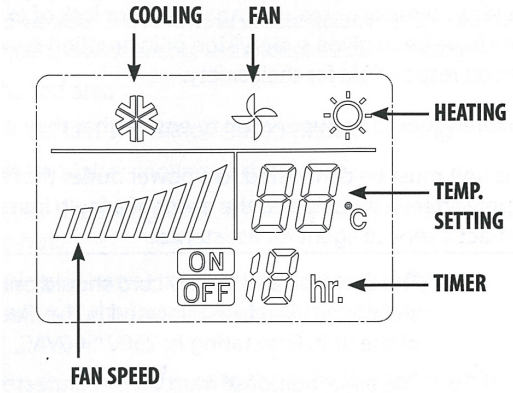
3.3 The air intake, exhaust and condensate drain on the sides of the external unit must be kept clear of any material that may block airflow or water drainage. Failure to keep these areas clear could cause poor performance, water leakage into your vehicle and permanent damage to the air-conditioner.

3.4 The air-conditioner must never be operated while the vehicle is moving. Before operating the air-conditioner, ensure that the vehicle is parked with the unit tilted no more than 5˚ from the horizontal.

This unit is designed to be operated on 230 - 240V 50Hz power from the electricity grid or a sine wave inverter equipped generator. The recommended generator capacity for this unit is 2.4 kVA Continous Power. When choosing a generator, please bear in mind that other devices and appliances may add to the demand on the generator. In this case, the generator capacity should be selected accordingly.

4. **CONTROLS**





4.1 REMOTE CONTROL

A/ **Power**
On/Off switch

B/ **Temperature Decrease**
Lowers to the desired room temperature (16-30˚C)

C/ **Temperature increase**
Raises to the desired room temperature (16-30˚C)

D/ **Fan Speed**
Cycles the interior fan through 3 speed settings.

E/ Timer

(i) ***On Timer***

Pressing this button while the unit is off will set the on timer. Each button press adds 1 hour to the wait time until the unit starts (1-12 hours). After cycling through 12 hours, the next button press will cancel the 'on' timer.

(ii) ***Off Timer***

Pressing this button while the unit is on will set the off timer. Each button press adds 1 hour to the wait time until the unit stops (1-12 hours). After cycling through 12 hours, the next button press will cancel the 'off' timer.

F/ Mode

Cycles through the 3 modes of airconditioner operation.

(i) ***Fan Mode***

Used for ventilation only. Fan speed can be changed between low, medium and high by pressing D- Fan Speed.

(ii) ***Cooling Mode***

The compressor and external fan will operate automatically to cool the cabin to achieve the desired temperature. Fan speed can be adjusted between low, medium and high by pressing D- Fan Speed.

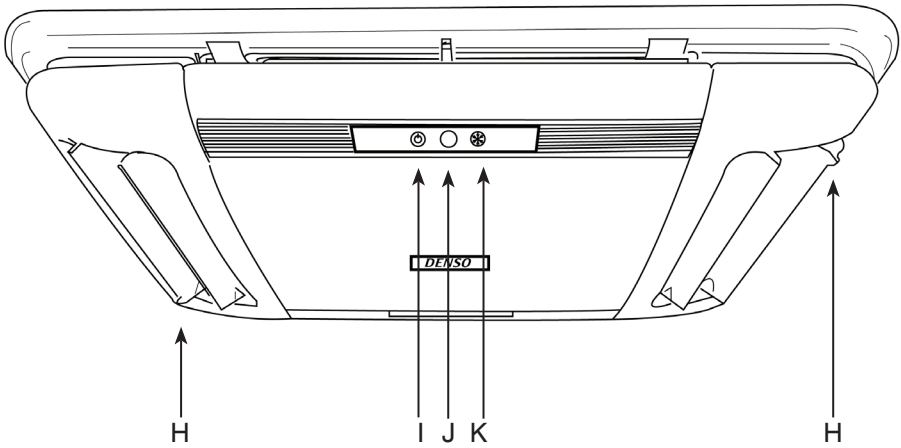
(iii) ***Heating Mode***

The compressor and external fan will automatically operate to heat the cabin to achieve the desired temperature. The interior fan speed can be adjusted between low, medium and high by pressing pressing D - Fan Speed to achieve an optimum heating performance.

G/ Quick Cool

The air-conditioner will change to maximum cooling mode and maximum fan speed for a period of 15 minutes during which the Quick Cool Indicator K will illuminate. After 15 minutes (or if the quick cool button G is pressed again) the air-conditioner will resume operation with the previous settings.

4.2 UNIT



H/ Directional Airflow Controls
Vertical airflow directional control.

I/ Power Indicator (Blue)
Illuminates when the air-conditioner is switched on.

J/ Infrared Remote Control Receiver
Electronic receiver for remote control signal.

K/ Quick Cool Mode Indicator (White)
Illuminates while the air-conditioner is operating in quick cool mode.

5. OPERATION

Ensure that the caravan is connected to a clean 230 - 240V power supply. If connected to a generator, it must be of the sine-wave type, and adequately rated.

⚠ CAUTION

Always ensure that the caravan's power supply cord is fully uncoiled before operating the unit to prevent overheating.

The Power indicator (I) will illuminate briefly when the power supply is connected and switched on.

5.1 Switch the air-conditioner on by pressing the Power Button (A) on the remote control while aiming the control in the direction of the Infrared Remote Control Receiver (J) on the ceiling mounted air distribution unit. The air-conditioner will beep and the Power Indicator (I) will illuminate to acknowledge the signal.

5.2 Set the desired operating mode (Fan, Cooling or Heating), Fan Speed (low, Medium or High) and the desired temperature (16 - 30˚C). The interior fan, exterior fan and compressor will operate automatically depending upon the settings chosen. Fan speed should be selected manually to the lowest level that achieves the desired room temperature.

Once the desired room temperature is reached, the air-conditioner will cycle the compressor and exterior fan to maintain the temperature level.

If the air-conditioner cannot reach a comfortable temperature in cooling mode, increase the fan speed to increase performance.

The desired temperature can be adjusted if you are too hot or cold.

5.3 Switch the unit off by pressing the Power button (A) on the remote control. The Power Indicator (I) will extinguish.

Alternatively, the unit can be set to switch off automatically using the Off Timer. While the unit is switched on, press the Timer button (E) on the remote control repeatedly until the display shows the desired number of hours until the airconditioner will switch off.

NOTE: *Whenever the remote control is used, it must be aimed in the direction of the Infrared Remote Receiver (J) on the Air Distribution Unit from a distance of less than 8m. The air distribution unit will beep once and the Power Indicator (I) will flash once to acknowledge the command.*

The compressor and exterior fan speed are microprocessor controlled to automatically ensure a long life for your air-conditioner while maintaining the best possible comfort. Depending upon the conditions and air-conditioner settings, you may notice some of the following:

a. ***Automatic Compressor Start Protection:*** The compressor start may be delayed for up to 3 minutes after selecting cooling or heating mode.

b. ***Exterior Fan Speed:*** The exterior fan may switch between high and low speeds to minimize the operating noise of the airconditioner for you and your neighbours.

c. ***Cooling Operating Range:*** The compressor may not operate in cooling mode if the outside temperature is greater than 45°C in order to protect the refrigerant system.

d. ***Heating Operating Range:*** The airconditioner is designed to operate in heating mode when the outside temperature is between 0-25°C. If the temperature is outside this range the compressor may not operate in order to protect the refrigerant system.

e. ***Preheat:*** The interior fan will not switch on in heating mode until the air-conditioner has warmed up sufficiently to deliver comfortably warm air. At very low temperatures this could take up to 10 minutes from the start of the compressor and exterior fan.

f. ***De-icing:*** The air-conditioner operates as a heat pump when in heating mode. Heat is drawn from the outside air to warm the vehicle. As the outside air temperature drops, less heat is available to the air-conditioner and a decrease in the heating performance may be noticed. When the outside temperature is very low (below 8°C) ice may form on the condenser in the air-conditioner. The microprocessor control has a fully automatic protection function that will remove the ice when required. Depending upon the conditions, you may notice the compressor, interior and exterior fans switching off as often as every 15 minutes to protect your air-conditioner and provide maximum comfort.

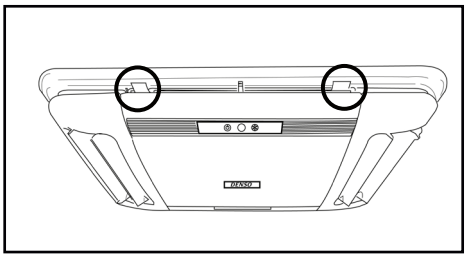
6. MAINTENANCE

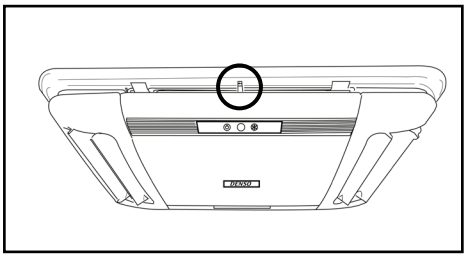
⚠ WARNING

Always ensure that the air-conditioner is isolated from the mains power supply by switching off the AC switch and safety circuit breaker, before performing and during any maintenance.

6.1 INLET AIR FILTER

Two dust filters are fitted to the return air inlet of the air-conditioner. These filters are essential to prevent a build up of dust blocking the evaporator. The filters (Part No. TA145520-2230) must be cleaned at least twice per year by washing in warm water with a mild household detergent. Allow the filters to dry, before re-installing. Replacement filters are available for purchase as spare parts should the original be damaged.





a. Flip down the two tabs on the sides of the filter, as shown in the image.

b. Flip down the centre tab, and use it to pull the air filter approximately 20 - 30 mms out of the unit.

c. Once the outer tabs are exposed, use them to gently pull the filter out of the unit.

d. After cleaning the filters carefully insert them back into the slots which are provided. Once the filter is fully in place, press down the three tabs to lock it in.

Repeat steps a, b and c above for the second filter on the other side of **the unit.**

⚠ CAUTION

Failure to clean the filter will result in decreased air-conditioner performance, increased noise and possible overheating and damage to the air-conditioner. The air-conditioner should never be operated without the filters installed.

6.3 REMOTE CONTROL BATTERIES

The infrared remote control is powered by 2 x AAA (LR03, 24A, MN2400) 1.5V batteries. Depleted batteries in the remote control will cause poor remote operating range. The batteries should be replaced as required with new batteries of the same type by removing the cover from the rear of the remote control. Take care to insert the new batteries with the correct polarity as indicated in the battery compartment.

⚠ CAUTION

Dead batteries may leak and damage the remote if left for long periods. Batteries should be removed from the remote if dead or if the air-conditioner is not to be used for a long period. Damage to the remote control caused by leaking batteries is not included in the terms of the manufacturer's defect warranty.

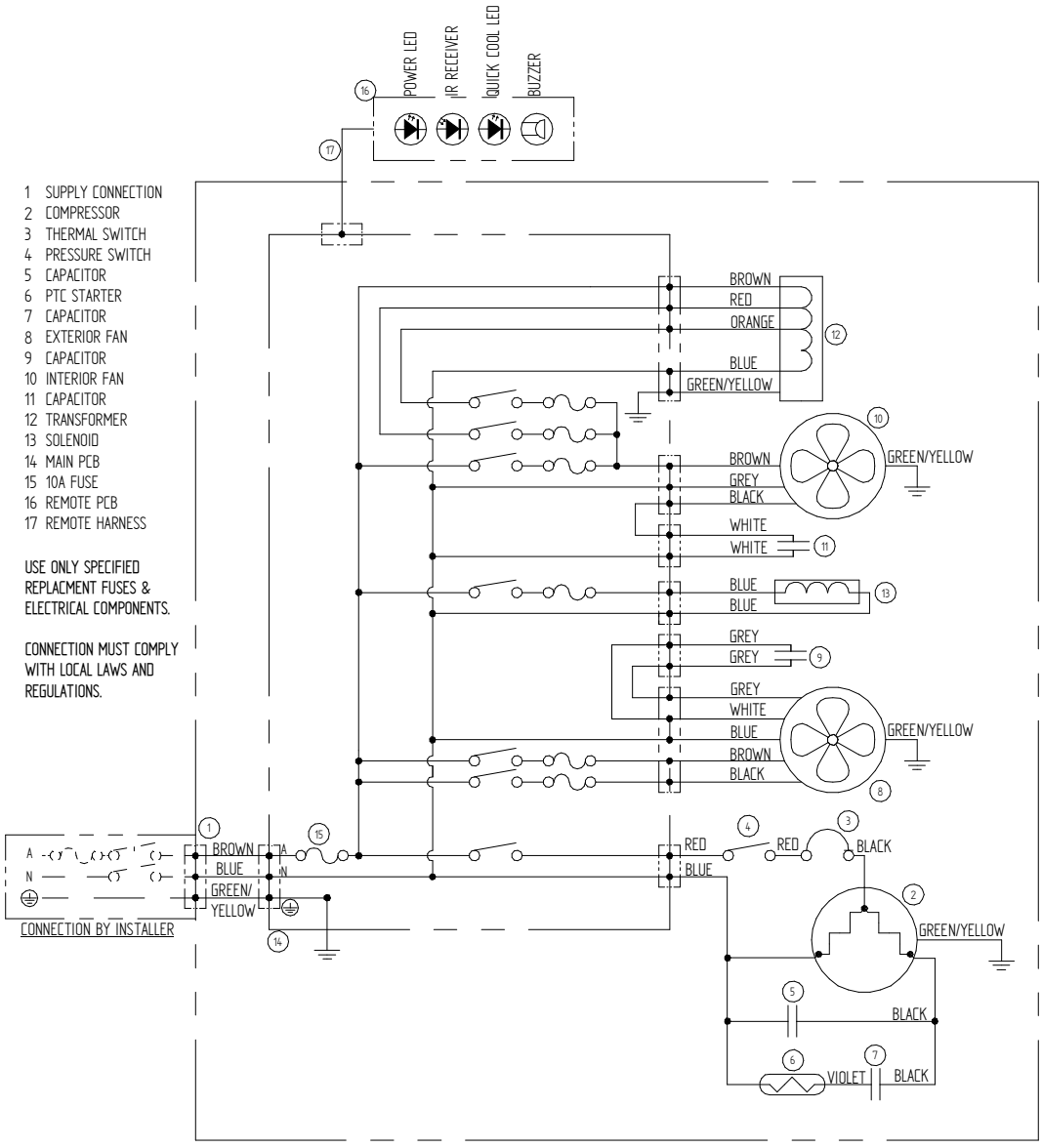
6.4 GENERAL CONDITION

Regularly inspect the condition of the unit for signs of damage, wear or malfunction. If used correctly, this air-conditioner should give you years of comfortable function. However, if you encounter any problems at any time, please switch power off the unit by switching off the AC switch and the safety circuit breaker on your caravan before getting in touch with your nearest Service Agent for assistance.

7. TECHNICAL DATA

Unit:	RT1 Air-Conditioner. Part No. TA448006-9260
Application:	Fixed roof caravans and motor homes
Typical Cooling Capacity:	2.5 kW
Typical Heating Capacity:	2.0 kW
Dimensions:	1096 x 739 x 207(H)
Weight:	39 Kg.
Power Supply:	230 - 240V AC, 50Hz
Maximum Rated Current:	8 A
Airflow volume:	340 m^3/h approx.
Refrigerant:	R410a
Refrigerant amount:	635g ± 10
Maximum operating incline:	5˚
Typical Temperature Range:	Cooling (16 - 48˚C) Heating (-3 to 25˚C)

7.1 WIRING DIAGRAM



8. TROUBLESHOOTING

Symptom	Cause	Remedy
Unit does not operate	Power supply is off	Check and confirm that the caravan main power is switched on. Check the AC switch and the safety circuit breaker on the caravan. All these should be switched on.
	Power interruption	To protect itself from damage, the unit may switch off (return to standby) if power is momentarily interrupted. Ensure that the caravan is connected to a clean power supply within the specified power operating range before attempting to restart the unit.
	Remote control not working	Remote control instructions are confirmed by a beep and the power LED blinking once. There is a short delay between a command being sent and the unit responding. Ensure that the remote control is pointed towards the air distribution unit from a distance less than 8m. Replace the batteries if necessary.
Exterior fan changes speed.	The speed of the exterior fan changes or switches off occasionally	The external fan is adjusted based on system and ambient conditions. Where possible, the exterior fan will switch to low speed for less disturbance to you and your neighbours. In heating mode, the exterior fan may switch off periodically to allow condensate to drain away
Poor performance	Blocked condenser	Check that the condenser (on the roof top) is not blocked with dust, leaves or rubbish. Clean if neccesary.
	Blocked filter	Inspect the indoor air filter on the inner air distribution unit. Clean or replace if necessary.
	Outside of operating temperature	Use within operating temperature range and follow guidelines in section 3.1
Compressor cuts or does not start.	The system has a number of inbuilt protection mechanisms to protect the compressor from operating outside its design limits	Ensure that the unit is being used within it's operating temperature range. Refer to the technical data for details of the operating ranges in section 3.1.

8. TROUBLESHOOTING - cont...

Symptom	Cause	Remedy
Unit operating continously	System unable to reach desired setpoint.	Change temperature setting on remote control (confirmed by beep & LED blink). Close all doors, windows and curtains to improve insulation and reduce the load on the system.
Both LED's flashing. Unit does not operate.	Both LED's flash together.	Power supply voltage is out of acceptable range for safe operation of the unit. Ensure that the caravan is connected to supply of correct voltage.
	Both LED's flash alternately.	Internal fault detected. Contact service centre for assistance.
Condensate formation	Condensate may form on cold surfaces when operating in humid conditions.	Ensure all doors and windows are properly sealed when running the air-conditioner. Keep all cupboards and drawers closed.
	The evaporator condensate drain is blocked. This may be indicated by water droplets being carried in the air.	Check and confirm that the condensate drains on the roof top unit are clear of dirt or other foreign material.

If symptoms persist after the above actions have been taken, switch off power to the air-conditioning unit at the safety circuit breaker and the air-conditioner switch on your caravan, and contact your nearest dealer or a qualified technician for help.

DENSO WARRANTY

AN IMPORTANT MESSAGE FROM DENSO

Thank you for purchasing a DENSO Product.

To ensure that Your DENSO Product performs properly and to ensure the validity of DENSO's Warranty, please follow all the instructions and recommendations concerning the installation, use, servicing, maintenance and repair of the Product, as set out in the documentation provided with the Product. If You require further assistance concerning the Product after reading all such instructions and recommendations, please contact Us, using the contact details in clause 3 below.
We recommend that You contact Us or an Authorised DENSO Service Representative for all Your service needs.

NOTICE TO CONSUMERS UNDER AUSTRALIAN CONSUMER LAW

The following applies if You are a 'consumer' under the Australian Consumer Law:

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

The benefits provided by DENSO's Warranty are in addition to any other rights and remedies of a consumer under the Australian Consumer Law and any other law which may apply to the Product.

1. WHAT IS COVERED BY THIS WARRANTY?
   We warrant that Your DENSO Product purchased in Australia is free from defects in material and workmanship, subject to the Exclusions set out in clause 7 and the other terms and conditions contained in this document.

2. WARRANTY PERIOD
   This Warranty applies to any defect in Your DENSO Product which appears within the period:
   (a) commencing on the date the Product was purchased from the Supplier; and
   (b) terminating 12 months after commencement.
   Any Product We repair or replace under this Warranty will be warranted by Us under this Warranty for the balance of this Warranty Period only.

3. WHO GIVES THIS WARRANTY?
   DENSO Automotive Systems Australia Pty Ltd
   2-46 Merrindale Drive
   Croydon, Vic, 3136

   Technical Service Department:
   Tel: 03 8761 1449
   Fax: 03 8761 1502
   Email: service.department@denso.com.au

4. WHAT WE WILL DO
   To honour this Warranty, We will:
   (a) repair or replace the Product, at Our option and expense;
   (b) arrange for the Product to be repaired or replaced, at Our option and expense; or
   (c) pay You an amount equivalent to the cost of repairing or replacing the Product.

5.WHAT YOU MUST DO

   To ensure that You remain entitled to claim under this Warranty, You must:
   (a) provide Us with satisfactory proof of purchase of the Product, which clearly indicates the name and address of the Supplier, the date and place of purchase, and identifies the Product (We recommend that You provide Us with a legible and unmodified receipt or sales invoice for the Product);
   (b) install, use, service, maintain and repair the Product in accordance with Our instructions and recommendations; and
   (c) ensure that none of the Exclusions in clause 7 apply.

6. PROCEDURE TO CLAIM UNDER THIS WARRANTY
   To make a claim under this Warranty, You must take the following steps:
   STEP 1
   Contact Us, during the Warranty Period, using the contact details in clause 3, and provide Us with Your name, address, telephone number, details of the Product, details of the Supplier and an outline of Your claim in relation to the Product. We will direct You to take the product to an Authorised Denso Service Repairer, the Supplier or us.

STEP 2

You must then take the Product to an Authorised Denso Service Repairer, the Supplier or us in accordance with our directions. You must provide satisfactory proof of purchase.

STEP 3

Following inspection of the Product, You will be informed whether Your claim has been accepted and, if so, whether the Product will be repaired or replaced at our expense, or whether You will be paid an amount equivalent to the cost of repairing or replacing the Product.

Neither the Supplier or any Authorised DENSO Service Repairer are authorised to accept Your claim on our behalf, unless expressly authorised by Us to do so. .

Please note that this Warranty does not cover any expenses You may incur in making a claim under this Warranty, including any cost of having an Authorised DENSO Service Repairer travel to the premises at which the Product is located, the cost of removing the Product from its place of installation or reinstalling the Product, and the cost of transporting the Product for the purposes of repair or replacement.

7. EXCLUSIONS

This Warranty does not apply if the Product is outside Australia or if the claim is wholly or partly attributable to any:

(a) failure to properly install, use, service, maintain and repair the Product, in accordance with any instructions or recommendations from Us;

(b) misuse of the Product including use of the Product for purposes other than its intended purpose, use of the Product contrary to Our instructions and recommendations, and use of the Product after it becomes apparent that it requires service, maintenance or repair;

(c) accidental damage including fire, theft and explosion;

(d) acts of God and damage or corrosion to the Product caused by environmental conditions including excessive moisture, acid rain, airborne fallout, stones, salt, sand, hail, wind, storms, lightning, floods, infestation by rodents or other vermin;

(e) modification of the Product in a manner not authorised by Us;

(f) incorporation of parts other than DENSO parts or other parts authorised by Us;

(g) normal wear and deterioration, having regard to the operating environment of the Product, including discoloration;

(h) routine service or maintenance costs;

(i) components warranted by other manufacturers;

(j) failure to respond in a timely manner to any malfunction of the Product;

(k) non-DENSO product, or any installation, service, maintenance or repair by a person other than an Authorised DENSO Service Repairer or other person approved by Us; or

(l) commercial use of the Product.

8. LIMITATION OF LIABILITY UNDER THIS WARRANTY

As indicated in clause 4, Your rights under this Warranty are limited to repair or replacement of the Product, or being paid the cost of repairing or replacing the Product. We will not be liable under this Warranty for any consequential loss including, without limitation, the injury or death of any person, damage to any other property, or loss of any income, profit or business.

9. EXCLUSION AND LIMITATION OF ANY OTHER LIABILITIES

Except as provided under this Warranty and by law, We give You no warranty, guarantee or similar right in relation to the Product. To the full extent permitted by law, We exclude any warranty, guarantee or similar right provided or implied by law.

If any warranty, guarantee or similar right provided or implied by law applies to the Product, to the full extent permitted by law We limit Our liability to You to the repair or replacement of the Product, or the cost of having the Product repaired or replaced.

Except as provided by law (including the Australian Consumer Law, if applicable), We will not be liable to You, whether in contract, tort or otherwise, for any loss or damage suffered as a result of You acquiring the Product.

10. DEFINITIONS

“Authorised DENSO Service Repairer” means a person or company authorised by Us to provide service for such Products.

“Product” means [the RT1 caravan air-conditioner unit] supplied with this Warranty in Australia, and used exclusively in Australia.

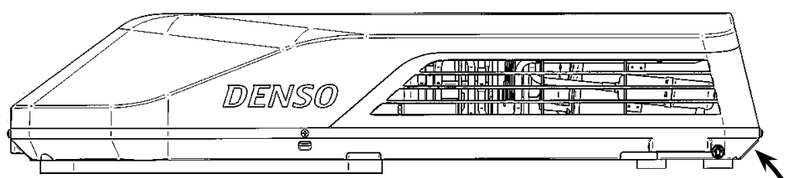
“Supplier” means the authorised distributor or retailer of the Product who sold You the Product or Us if We sold you the Product.

“Warranty Period” means the period of time defined in clause 2.

“We” or “Us” or “Our” means DENSO Automotive Systems Australia Pty Ltd ACN 007 110 929.

“You” or “Your” means the retail purchaser of the Product from the Supplier or the original end-user of the Product.

All electrical work and permanent wiring must be carried out by an appropriately qualified person in accordance with national wiring regulations and all other applicable local codes and regulatory authority requirements. This unit must be earthed & connected through a suitably rated two-pole switch allowing disconnection of the active & neutral conductors.



Location of the Serial Number on the roof top unit:

PLEASE REMOVE AND RETURN OWNER'S REGISTRATION CARD WITHIN 30 DAYS OF PURCHASE

REGISTRATION OF YOUR UNIT

Once installed, owners are encouraged to register their product with DENSO.

Please follow the link, via the QR code to complete on-line registration or log on to www.denso.com.au/caravan and look for the "on-line registration forms - Caravan Airconditioning."

Alternatively, complete the below form and mail it to DENSO.

Name: _____

Address: _____

_____

Telephone: _____

Caravan brand: _____

Caravan model: _____

Date of purchase: _____

Place of purchase: _____

Installed by: _____

Serial No: ** _____

** *See page #17 for location of Serial No.*